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(54) **REPAIRABLE BUCKLE**

USPC ..... 24/163 R, 193, 196, 200, 614, 615,  
24/265 EC

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See application file for complete search history.

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29, 2014.

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**A44B 11/00** (2006.01)  
**A44B 11/25** (2006.01)  
**A44B 11/26** (2006.01)

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(2013.01); **Y10T 24/40** (2015.01)

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A44B 11/10; A44B 11/04; A44B 11/263;  
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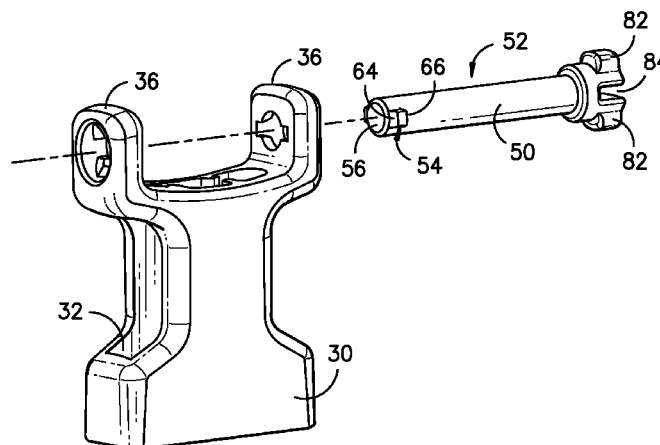
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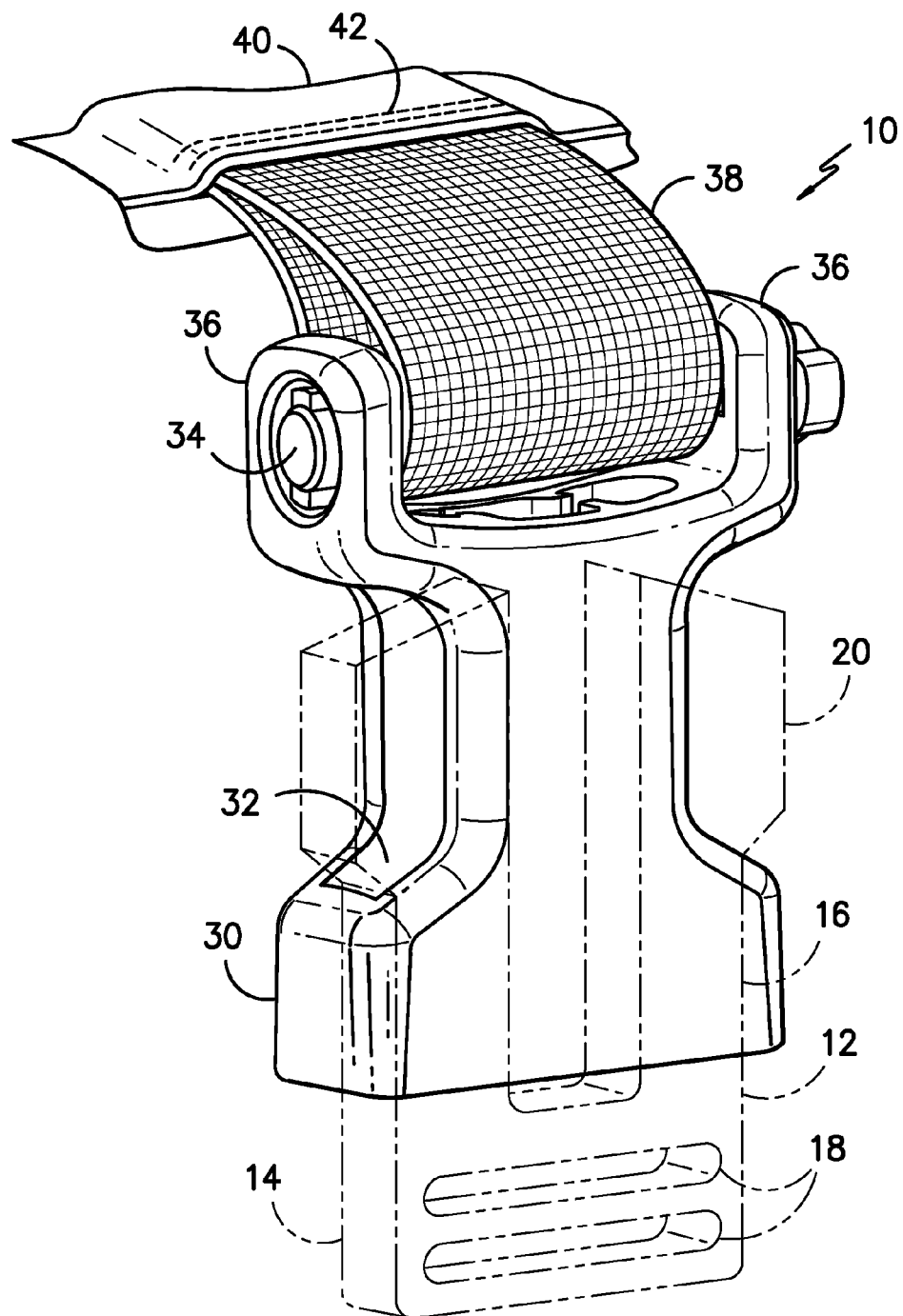
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(57) **ABSTRACT**

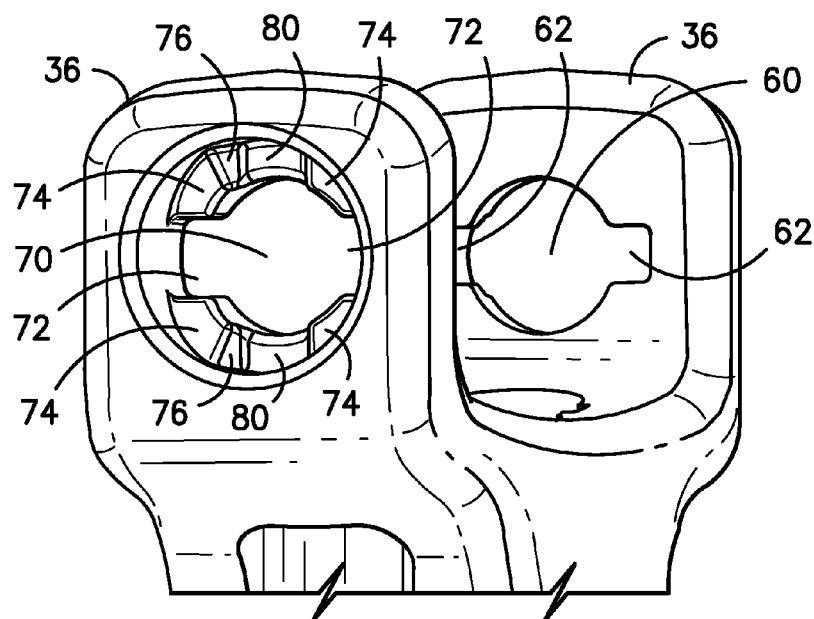
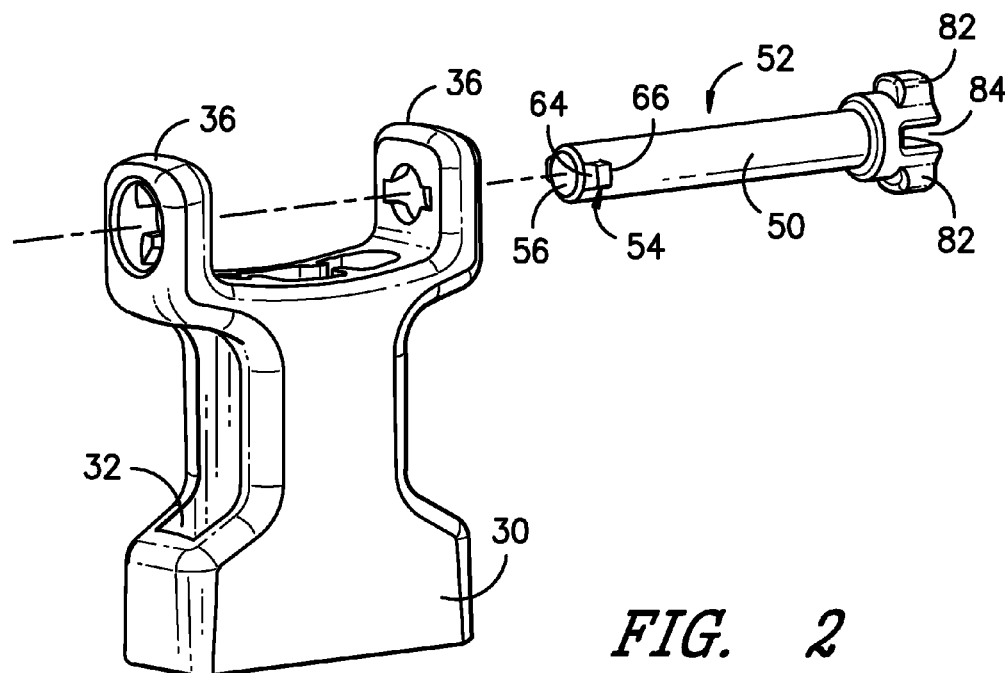
A latching buckle assembly wherein one buckle component includes a removable cross-bar adapted to receive an attachment strap in looped relation. The cross-bar is adapted to hold the attachment strap in place during use while permitting free relative rotation. When the cross-bar is removed, the webbing can be disengaged from the buckle member to facilitate replacement if required.

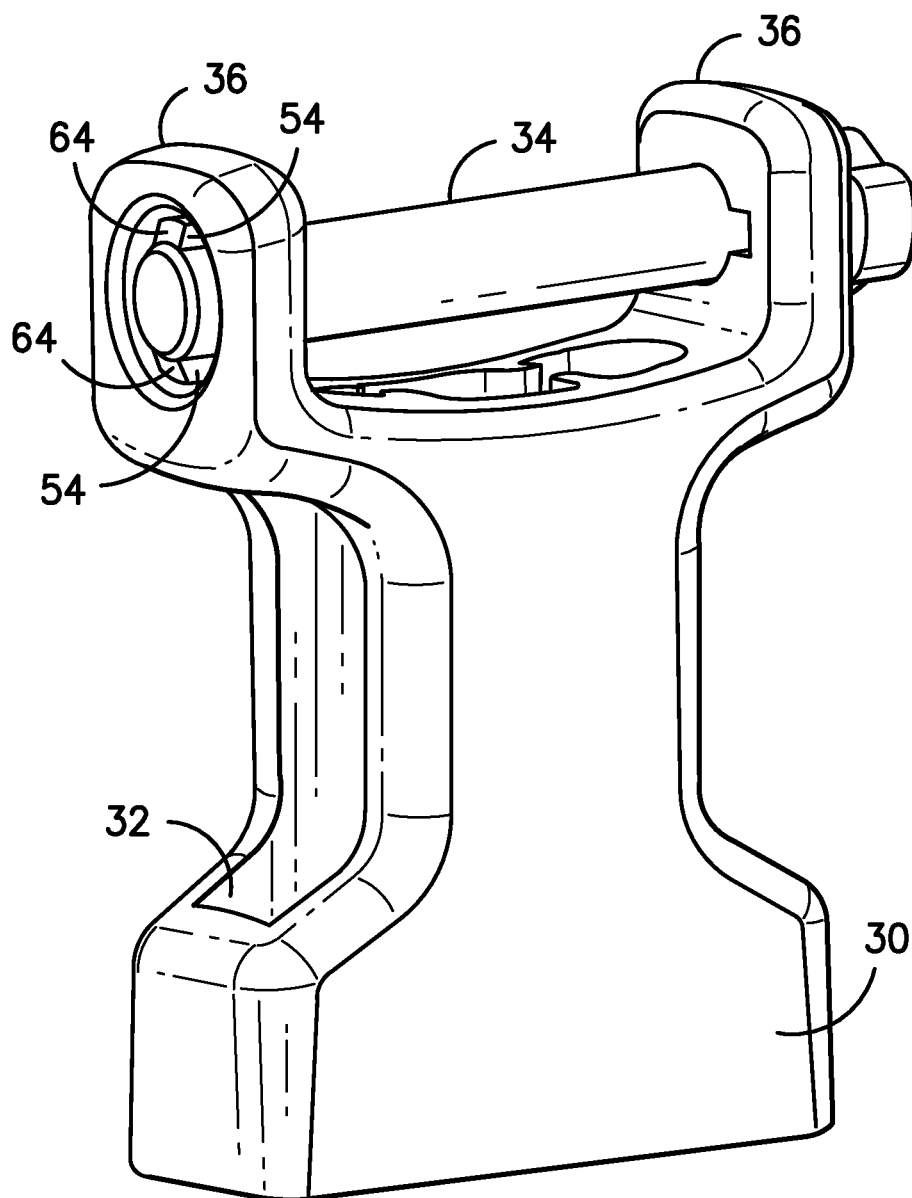
**8 Claims, 4 Drawing Sheets**



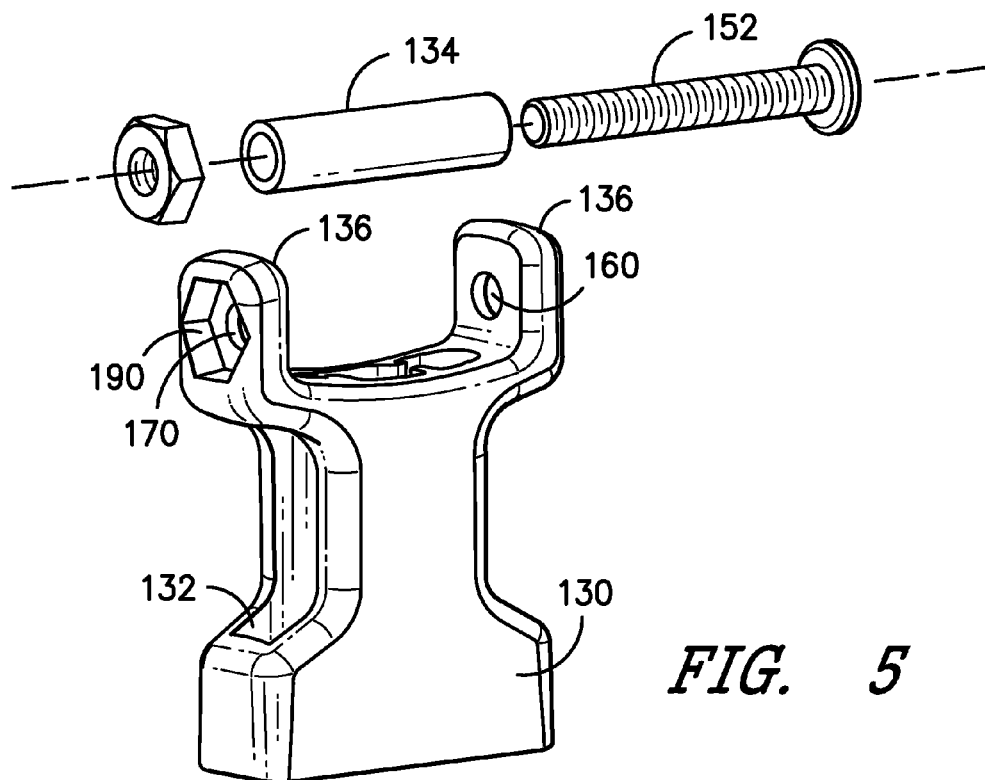


**FIG. 1**

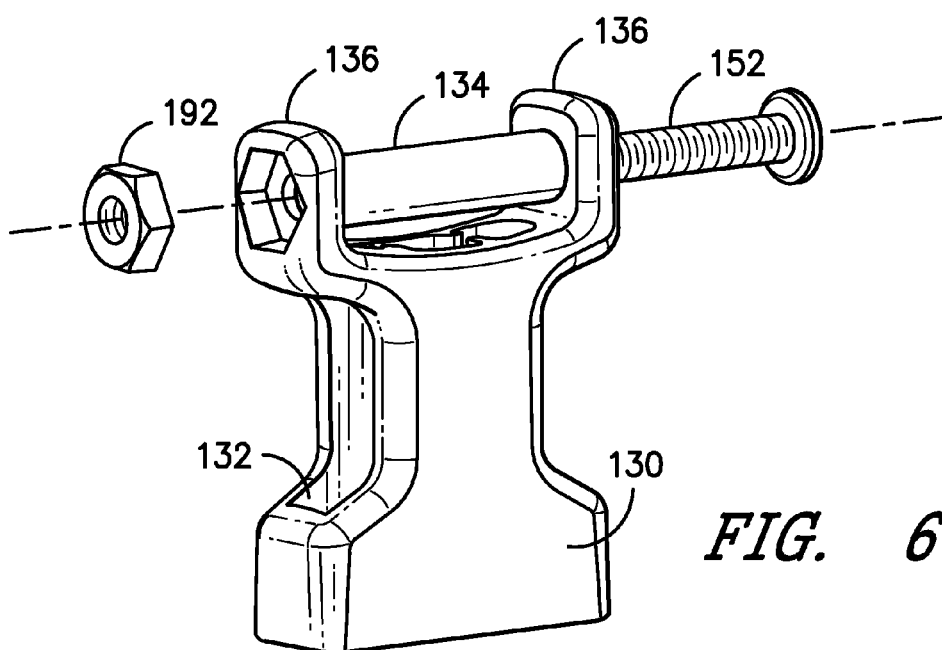




*FIG. 4*



*FIG. 5*



*FIG. 6*

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## REPAIRABLE BUCKLE

### CROSS REFERENCE TO RELATED APPLICATIONS

The present non-provisional United States Patent Application claims the benefit of, and priority from, U.S. Provisional Application 61/932,869 filed on Jan. 29, 2014. The contents of such referenced application are hereby incorporated herein by reference in their entirety.

### TECHNICAL FIELD

The present disclosure relates generally to buckles which are operatively connected to support surfaces such as backpacks, clothing and the like by the use of looped connection straps.

### BACKGROUND

Two-piece buckles that snap together and latch automatically upon adequately inserting a male component into a female component are known and are used in a variety of applications. In past constructions, one of the members (typically the female member defining the buckle body) includes an eyelet with a fixed cross-bar positioned at a distal end located away from the connection point to the other member. A short piece of webbing is looped through the eyelet and the free ends of the webbing are then stitched or otherwise connected to a support surface such as a backpack, article of clothing or other structure. A secure connection between the buckle member and the support surface is thereby established.

The use of a buckle member of unitary construction with a webbing connection sewn to a support surface provides an excellent connection during use. However, in the event that the buckle member is damaged, replacement of the damaged part requires that one end of the webbing to be cut or otherwise detached from the support surface for rethreading through a replacement buckle member. The free end of the webbing must then be reattached to the support surface. This replacement procedure is thus time consuming and requires substantial skill. Accordingly, a buckle assembly which provides secure attachment during use, while nonetheless facilitating ease of replacement would represent a significant advancement over the current art.

### SUMMARY OF THE DISCLOSURE

The present disclosure provides advantages and alternatives over the prior art by providing a latching buckle assembly wherein one buckle component includes a removable cross-bar adapted to receive an attachment strap in looped relation. The cross-bar is adapted to hold the attachment strap in place during use. When the cross-bar is removed, the webbing can be disengaged from the buckle member to facilitate replacement if required.

In one aspect thereof, the present disclosure provides a buckle assembly including a receiving body component and a latch component adapted for insertion into the receiving body component. At least the body component comprises a first upstanding ear and a second upstanding ear disposed in spaced-apart relation from one another on opposing lateral sides of the buckle component. The first upstanding ear comprises an entrance opening and the second upstanding ear comprises an exit opening disposed in substantially aligned relation to the entrance opening. A displaceable pin

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extends matedly through the entrance opening and the exit opening such that the displaceable pin defines a removable cross-bar extending in spanning relation between the first upstanding ear and the second upstanding ear at an elevation such that an attachment strap may be disposed in looped relation to the displaceable pin such that the receiving body component is rotatable relative to the attachment strap.

Other features and advantages of the disclosure will become apparent to those skilled in the art upon review of the following detailed description, claims and drawings in which like numbers are used to designate like features.

### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic perspective view illustrating an exemplary buckle assembly consistent with the present disclosure;

FIG. 2 is a partial assembly view of a first embodiment of a buckle component consistent with the present disclosure adapted for engagement with a webbing loop illustrating a removable cross-bar in the displaced condition;

FIG. 3 is a schematic side view illustrating the buckle component of FIG. 2, showing surfaces adapted to hold the removable cross-bar in place after insertion

FIG. 4 is a view similar to FIG. 2, illustrating the removable cross-bar in its operative position;

FIG. 5 is a partial assembly view of a second embodiment of a buckle component consistent with the present disclosure adapted for engagement with a webbing loop illustrating a removable cross-bar in the displaced condition; and

FIG. 6 is a view similar to FIG. 5, illustrating the removable cross-bar in its operative position;

Before the embodiments of the invention are explained in detail, it is to be understood that the disclosure is not limited in its application to the details of construction and the arrangements of the components set forth in the following description or illustrated in the drawings. The disclosure is capable of other embodiments and of being practiced or being carried out in various ways. Also, it is understood that the phraseology and terminology used herein are for the purpose of description and should not be regarded as limiting. The use herein of "including", "comprising" and variations thereof is meant to encompass the items listed thereafter and equivalents thereof, as well as additional items and equivalents thereof.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now more specifically to the drawings and to FIGS. 1-4 in particular, a buckle 10 in accordance with the present disclosure is shown. As illustrated, the exemplary buckle 10 includes a male latch component 12 having a proximal base 14 and a pair of flexible distal legs projecting away from the proximal base 14. As shown, the proximal base 14 may include a pair of eyelets 18 for connection to an adjustable strap (not shown) in a manner as will be well understood by those of skill in the art. The distal legs 16 may each include a lateral shoulder feature 20 for use in establishing a snap connection within a hollow receiving body 30. As shown, in the illustrated exemplary construction, the receiving body 30 includes a pair of lateral openings 32 on opposing sides for receipt of the lateral shoulder features 20 on the distal legs 16. The receiving body 30 also includes a cross-bar generally designated as 34 extending between a pair of upstanding ears 36. The cross-bar 34 engages an attachment strap 38 of fabric or the like in looped relation.

The male latch component **12** and the female receiving body **30** and cross-bar **34** each can be made as individual monolithic structures of plastic formed by injection molding processes, or the like. However, it is likewise contemplated that other materials of construction such as metals or the like may be used to form one or more of the components if desired. By way of example only, and not limitation, exemplary polymeric construction materials may include Nylon 6, Nylon 6.6 and ABS. However, virtually any other moldable plastic with adequate strength may be used.

As shown, the attachment strap **38** may be connected in fixed relation to a support structure **40** such as the surface of a backpack, article of clothing or the like. By way of example only, and not limitation, the attachment strap **38** may be held in place at the support structure **40** by stitching **42** or other connection means as will be well known to those of skill in the art.

During use, the distal legs **16** may be inserted into, and received by, the hollow receiving body **30** such that the lateral shoulder features **20** project through the lateral openings **32** of the receiving body, whereby the buckle **10** is latched. Due to the presence of the attachment strap **38** in looped relation to the cross-bar **34**, an operative connection is established between the support structure **40** and any strap or other structure which may be connected to the latch component **12**. The relatively loose looped relation between the attachment strap **38** and the cross-bar **34** also permits the buckle **10** to rotate freely about an axis defined by the cross-bar, thereby facilitating ease of manipulation. When the buckle is to be unlatched, a user may press the distal legs **16** towards one another to permit withdrawal of the latch component **12** in a manner as will be well known.

The features of the present disclosure facilitate the replacement of a buckle component by use of a cross-bar **34** which can be readily disengaged from the attachment strap **38** in the event that the buckle component becomes damaged. In this regard, it is to be understood that while the displaceable cross-bar **34** is illustrated and will be described in operative connection to the receiving body **30** of the buckle **10**, it is likewise contemplated that the same constructions may alternatively be used on the latch component **12** if desired. By way of example only, in such an alternative construction, the cross-bar **34** could replace the base eyelets **18** and extend between ears forming lateral sides of the latch component proximal base. However, the operation of the cross-bar would be the same.

Referring now jointly to FIGS. 2-4, in a first illustrated exemplary construction, the cross-bar **34** is provided by a substantially smooth surface shaft portion **50** of a displaceable pin **52** formed by practices such as injection molding or the like from materials as previously described. By way of example only and not limitation, the displaceable pin **52** may be formed from the same material as the receiving body **30** and/or the latch component **12**. However, different materials of construction may also be used if desired. As best seen through joint reference to FIGS. 2 and 4, the displaceable pin **52** may include a pair of lateral posts **54** located adjacent to the distal end **56** of the pin **52**. As best seen through joint reference to FIGS. 2 and 3, the distal end **56** of the pin **52** is adapted to be inserted into an entrance opening **60** in the form of a keyed passageway on one of the ears **36** such that the lateral posts **54** are substantially aligned with a pattern of perimeter insert slots **62** extending radially outwardly from opposing sides of a central portion of the entrance opening **60**. In accordance with one exemplary practice, the insert slots **62** are slightly undersized relative to the lateral posts **54** to facilitate non-reversible, press-fit insertion. In this regard,

the lateral posts **54** may each include a leading face **64** which is slightly chamfered and narrower than a rear face **66** which is substantially planar. This construction defines a generally trapezoidal profile to facilitate press-fit insertion and retention.

In the illustrated exemplary construction, after passing through the entrance opening **60**, the distal end **56** of the pin **52** may be inserted through an exit opening **70** defining a keyed passage on the ear **36** opposing the entrance opening. During this insertion through the exit opening **70**, the lateral posts **54** are substantially aligned with a pattern of perimeter exit slots **72** on opposing sides of a central portion of the exit opening **70**. The perimeter exit slots may be slightly oversized relative to the lateral posts **54** to facilitate unobstructed pass-through when the pin **52** is properly aligned. As will be appreciated, the oversized condition of the exit slots will also prevent locking engagement of the pin **52** within the exit opening **70** in the event that insertion is made from the incorrect side. That is, in the event that the pin **52** is inadvertently inserted from the incorrect side, no locking engagement will take place and the pin **52** may be easily withdrawn for proper insertion through the entrance opening **60**.

As shown, in the illustrated exemplary construction, the exterior surface of the exit opening **70** includes a pattern of ramped surfaces adapted to engage the lateral posts **54** after insertion. As best seen in FIG. 3, this pattern includes four extended ramp surfaces **74** of gradual slope positioned immediately adjacent to the exit slots **72**. The extended ramp surfaces **74** are characterized by an elevation increase as distance increases away from the exit slots **72**. Thus, the highest elevation for each of the extended ramp surfaces **74** is furthest removed from the exit slots **72**. The exemplary pattern of ramped surfaces also includes four barrier ramp surfaces **76** of steeper slope than the extended ramp surfaces **74**. The barrier ramp surfaces **76** are characterized by an elevation decrease as distance increases away from the exit slots **72**. Thus, the lowest elevation for each of the barrier ramp surfaces **76** is furthest removed from the exit slots **72**. As shown, the exemplary pattern of ramped surfaces also includes pair of depressed pin recesses **80**. Each pin recess is located between a pair of the barrier ramp surfaces **76** and is oriented with a length dimension in transverse relation to the exit slots **72**.

Following insertion of the lateral posts **54** through the exit opening, the pin may be rotated by  $\frac{1}{4}$  turn in either direction to cause the lateral posts **54** to be captured within the pin recesses **80**. Rotation may be carried out by finger tightening using wings **82** at the proximal end of the pin **52**. Alternatively, a tool engagement slot **84** may be used in conjunction with a driving tool such as a screwdriver, coin or the like (not shown). As will be appreciated, during locking rotation, the rear faces **66** of the lateral posts **54** will first move in camming relation over the increasing elevation extended ramp surfaces **74** and will then be guided over the decreasing elevation barrier ramp surfaces **76** for deposit into the pin recesses **80**. In this condition with the lateral posts **54** within the pin recesses **80**, any substantial rotation is blocked by the relatively steep slope of the barrier ramp surfaces **76**. During use, the shaft portion **50** of the pin **54** remains substantially stationary and does not rotate. However, the looped attachment strap **32** nonetheless permits relative rotation between the buckle **10** and the attachment strap **38** about an axis defined substantially by the shaft portion **50**.

In the event that the buckle **10** is to be disengaged from the attachment strap **38**, the pin **52** may be removed by application of a sufficient torque in either direction to permit

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the lateral posts **54** to move in a cramming action over the barrier ramp surfaces **76** and the extended ramp surfaces **74** to a position in alignment with the exit slots **72** for withdrawal. As will be appreciated, during this removal operation, a significant initial torque must be applied in order to move the lateral posts away from the pin recesses **80** and over the initial steep slope of the barrier ramp surfaces **76**. Thus, inadvertent removal is avoided. However, once the extended ramp surface **74** is reached, the slope actually decreases towards the exit slots **72** thereby urging the pin **52** towards the proper orientation for withdrawal. Once the lateral posts **54** are in alignment with the exit slots **72**, the distal end **56** of the pin **52** may be withdrawn from the exit opening **70** and towards the entrance opening **60**. Nonetheless, full extraction of the pin **52** will be blocked by the undersized insert slots **62**. Thus, the pin **52** cannot be lost.

As will be understood, the ability to insert and withdraw the pin **52** permits the selective engagement and disengagement with a looped attachment strap **38**. Thus, the attachment strap **38** may be secured in looped relation to a support structure before establishing an operative connection to the buckle **10**. Likewise, after an operative connection is established, that connection may be reversed to replace a buckle component if desired. The operative connection can then be reestablished without any need to disengage the attachment strap **38** from its support structure **40**. As will be appreciated, this ability for selective engagement and disengagement promotes significant flexibility of operation.

Referring now to FIGS. **5** and **6**, an alternative construction for a buckle component consistent with the present disclosure is provided. In FIGS. **5** and **6** all elements corresponding to those described previously and designated by like reference numerals increased by 100. As shown, in this exemplary construction, the hollow receiving body **130** includes a pair of upstanding ears **136** disposed at positions above lateral openings **132** on either side of the receiving body **130**. One of the ears **136** includes an entrance opening **160**. The other one of the ears includes an exit opening **170**.

In the illustrated exemplary embodiment of FIGS. **5** and **6**, a displaceable pin in the form of a threaded bolt **152** may pass between the ears **136** in mated relation to the entrance opening **160** and the exit opening **170**. A rotatable sleeve **134** defining a cross-bar in inboard relation to the ears **136** is disposed in surrounding relation to the bolt **152**. The inner diameter of the rotatable sleeve **134** is greater than the outer diameter of the bolt **152** thereby permitting substantially free rotation of the rotatable sleeve **134** relative to the bolt **152**. As illustrated, a nut **192** or other tightening member may be used to secure the bolt **152** in place in spanning relation between the ears **136**. In the final connected condition, the nut **192** may be held within a matched recess **190** to avoid inadvertent turning during use.

The receiving body **130** and rotatable sleeve **134** each can be made as individual monolithic structures of plastic formed by injection molding processes, or the like. However, it is likewise contemplated that other materials of construction such as metals or the like may be used to form one or both components if desired. By way of example only, and not limitation, exemplary polymeric construction materials may include Nylon 6, Nylon 6.6 and ABS. However, virtually any other moldable plastic with adequate strength may be used.

The length of the rotatable sleeve **134** is preferably slightly less than the distance between ears **136**. As will be appreciated, this slightly shortened distance will facilitate substantially free rotation about the bolt **152**. However, it is

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preferable to avoid substantial exposure of the threads on bolt **152** to avoid undue wear of the surrounding attachment strap (not shown).

As will be readily understood, the bolt **152** with the surrounding rotatable sleeve may be inserted through the loop of an attachment strap to establish the same kind of operative connection illustrated in FIG. **1**. The bolt **152** is held in place in by the nut **192**, such that rotation of the bolt **152** is prevented. In this condition, the rotatable sleeve **134** is nonetheless able to rotate substantially freely. During use, the looped attachment strap rides on the rotatable sleeve **134** thereby providing substantially free rotation between the buckle and the attachment strap. This operative connection also reduces the likelihood that the attachment strap will cause the bolt **152** to turn during use. After an initial operative connection is established, that connection may be reversed to replace a buckle component if desired. This reversal may be carried out by simply disengaging the bolt **152** from the nut **192** and withdrawing the bolt **152** from the ears **136**. The operative connection can then be reestablished by reinsertion of the bolt without any need to disengage the attachment strap from its support structure **40**. As will be appreciated, this ability for selective engagement and disengagement promotes significant flexibility of operation.

Variations and modifications of the foregoing are within the scope of the present disclosure. It is understood that the disclosure disclosed and defined herein extends to all alternative combinations of two or more of the individual features mentioned or evident from the text and/or drawings. All of these different combinations constitute various alternative aspects of the present disclosure. The embodiments described herein explain the best modes known for practicing the disclosure and will enable others skilled in the art to utilize the disclosure. The claims are to be construed to include alternative embodiments to the extent permitted by the prior art.

Various features of the disclosure are set forth in the following claims.

What is claimed is:

1. A buckle assembly comprising: a receiving body component and a latch component adapted for insertion into the receiving body component, wherein at least the receiving body component comprises a first upstanding ear and a second upstanding ear disposed in spaced-apart relation from one another on opposing lateral sides of the receiving body component, each of the first upstanding ear and the second upstanding ear projecting in the direction of insertion of the latch component, wherein the first upstanding ear comprises an entrance opening and the second upstanding ear comprises an exit opening disposed in substantially aligned relation to the entrance opening, wherein the entrance opening and the exit opening each include a pattern of perimeter slots extending away from a central portion to define a keyed passageway, the exit opening having an outboard side comprising a pattern of sloped surfaces of alternating slope and a pair of pin recesses, the pin recesses having a length dimension oriented in transverse relation to the perimeter slots, and wherein a displaceable pin extends matedly through the entrance opening and the exit opening such that the displaceable pin defines a removable cross-bar extending in spanning relation between the first upstanding ear and the second upstanding ear, the displaceable pin comprising a shaft portion including a distal end and plurality of lateral posts disposed adjacent to the distal end, wherein the lateral posts each include a rear face adapted to move in camming action over the sloped surfaces at the outboard side of the exit opening when the displaceable pin



is rotated, wherein the displaceable pin is at an elevation such that an attachment strap may be disposed in looped relation to the displaceable pin such that the receiving body component is rotatable relative to the attachment strap.

2. The buckle assembly as recited in claim 1, wherein the displaceable pin further includes a proximal end comprising finger engagement wings. 5

3. The buckle assembly as recited in claim 1, wherein the displaceable pin further includes a proximal end comprising a tool engaging slot. 10

4. The buckle assembly as recited in claim 1, wherein the perimeter slots of the entrance opening are smaller than the perimeter slots of the exit opening.

5. The buckle assembly as recited in claim 4, wherein the lateral posts are sized to pass in press-fit, keyed relation through the perimeter slots of the entrance opening and to pass in substantially unobstructed keyed relation through the perimeter slots of the exit opening. 15

6. The buckle assembly as recited in claim 1, wherein the receiving body component is a monolithic molded plastic structure. 20

7. The buckle assembly as recited in claim 1, wherein the displaceable pin is a monolithic molded plastic structure.

8. The buckle assembly as recited in claim 1, wherein the receiving body component and the displaceable pin are each molded from a polymeric material selected from the group consisting of Nylon and ABS. 25

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